SOE 5: Air Quality

Adoption of measures to meet the World Health Organization air quality guideline values should be the target to aim for in the Clean Air Strategy.

ACTIONS – WHAT IS NEEDED?

The publication and implementation of the planned National Clean Air Strategy is needed to protect Ireland's air quality. The adoption of the World Health Organization guideline values as national air quality standards within the strategy would provide for a higher level of public health protection. Integrating air pollution controls, noise mitigation measures and climate action, for example in transport management, can bring multiple benefits.

The publication and implementation of the planned National Clean Air Strategy is needed to protect Ireland's air quality
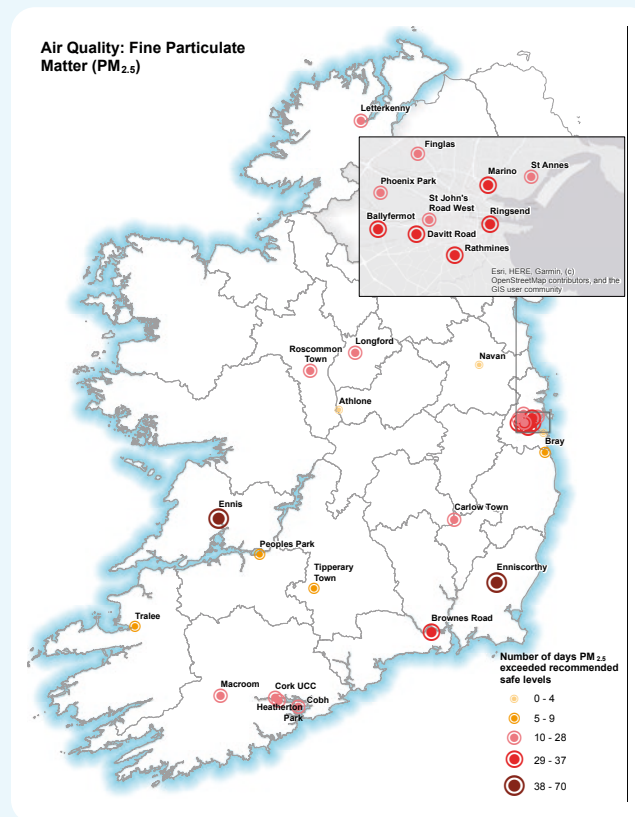
The burning of solid fuels for home heating and our reliance on diesel motor vehicles are negatively impacting the quality of the air we breathe.

Air pollution is the most significant environmental contributor to the burden of disease worldwide. The UN estimate that it causes an estimated 6-7 million premature deaths each year. In Ireland, there are an estimated 1300 premature deaths annually caused by poor air quality, due predominantly to fine particulate matter (with a diameter less than 2.5µm, $PM_{2.5}$). There is no known safe level of air pollution. The World Health Organization (WHO) advises that even brief periods of exposure to high concentrations of air pollutants have measurable adverse impact on health. Fine particulate matter (PM) is a mixture of small, harmful particles that are released into the air when solid fuels – like wood, peat and coal – are burned in our homes.

Fine particulate matter ($PM_{2.5}$) can be absorbed deep into our lungs – which can be especially problematic for asthma and COPD sufferers.

This map on the right shows the number of days in 2018 where air monitoring records show that the WHO recommended safe levels for PM were exceeded.

By switching away from solid fuels and moving towards more energy efficient buildings, we can help make our air safer to breathe while also reducing the Greenhouse Gas emissions that contribute to climate change.

Air Quality: Fine Particulate Matter ($PM_{2.5}$)

Letterkenny
Finglas
Marino   St Annes
Phoenix Park
St John's
Road West   Ringsend
Ballyfermot
Davitt Road
Rathmines

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community

Roscommon Town   Longford
Navan
Athlone
Bray
Carlow Town
Ennis
Peoples Park
Enniscorthy
Tipperary Town
Tralee
Brownes Road
Macroom   Cork UCC
Heatherton   Cobh
Park

Number of days $PM_{2.5}$ exceeded recommended safe levels
- 0 - 4
- 5 - 9
- 10 - 28
- 29 - 37
- 38 - 70
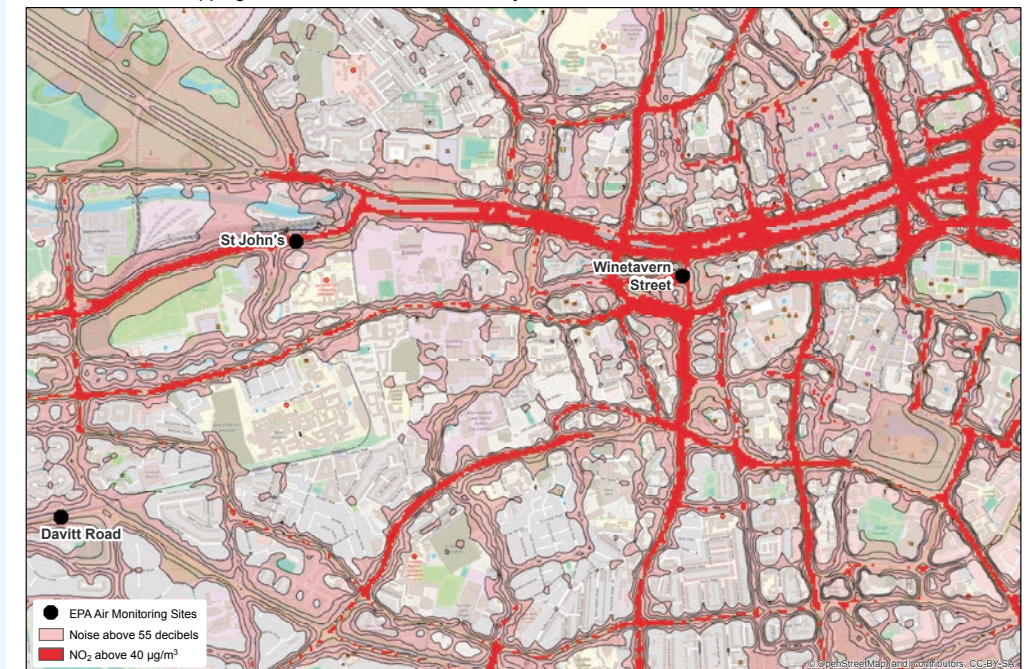
Traffic, noise and air pollution

As our population increases, our urban areas become home to more people. This map shows some of the health impacts of urban living. One aspect is traffic. Making our urban areas healthier will require new approaches to transport.

Nitrogen dioxide is an air pollutant that causes respiratory issues. The red lines in the map on the right show modelled annual average nitrogen dioxide (NO2) concentrations that are above the EU Annual Limit Value of 40 micrograms/m^3. It's closely associated with traffic emissions from diesel vehicles.
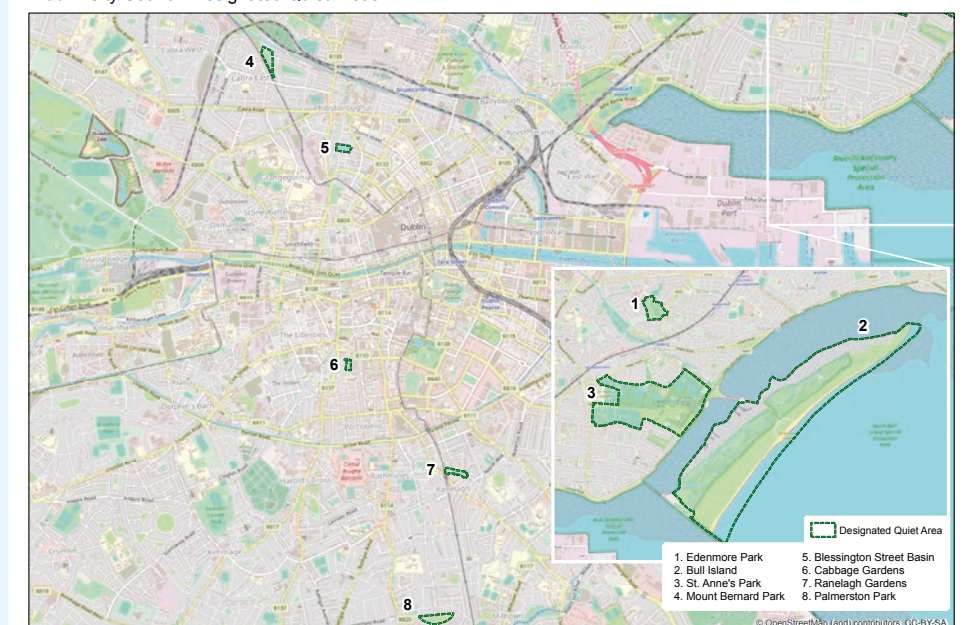
The pink lines show corridors where traffic and noise modelling indicates that environmental noise exceeds 55 decibels in a whole day. Traffic movement is a main cause of urban environmental noise. "Environmental noise" is the term given to unwanted sound that comes from human activities like transport and industry. The WHO has warned that the health burden of environmental noise is second only to air pollution in Europe.

Under the Environmental Noise Directive, Local Authorities must create Noise Action Plans. Noise pollution from transport can be mitigated to some extent by switching to electric vehicles, traffic calming measures, incentivising active travel and changes to road surface. An important element of noise planning is to protect existing quiet areas. The map on the right shows quiet areas designated in Dublin.

Predictive Noise Mapping and NO_2 Pollution in Dublin City Centre

St John's
Winetavern Street
Davitt Road

- EPA Air Monitoring Sites
- Noise above 55 decibels
- NO_2 above 40 µg/m^3

Dublin City Council: Designated Quiet Areas

4
5
1
2
6
3
7
8

- Designated Quiet Area

1. Edenmore Park
2. Bull Island
3. St. Anne's Park
4. Mount Bernard Park
5. Blessington Street Basin
6. Cabbage Gardens
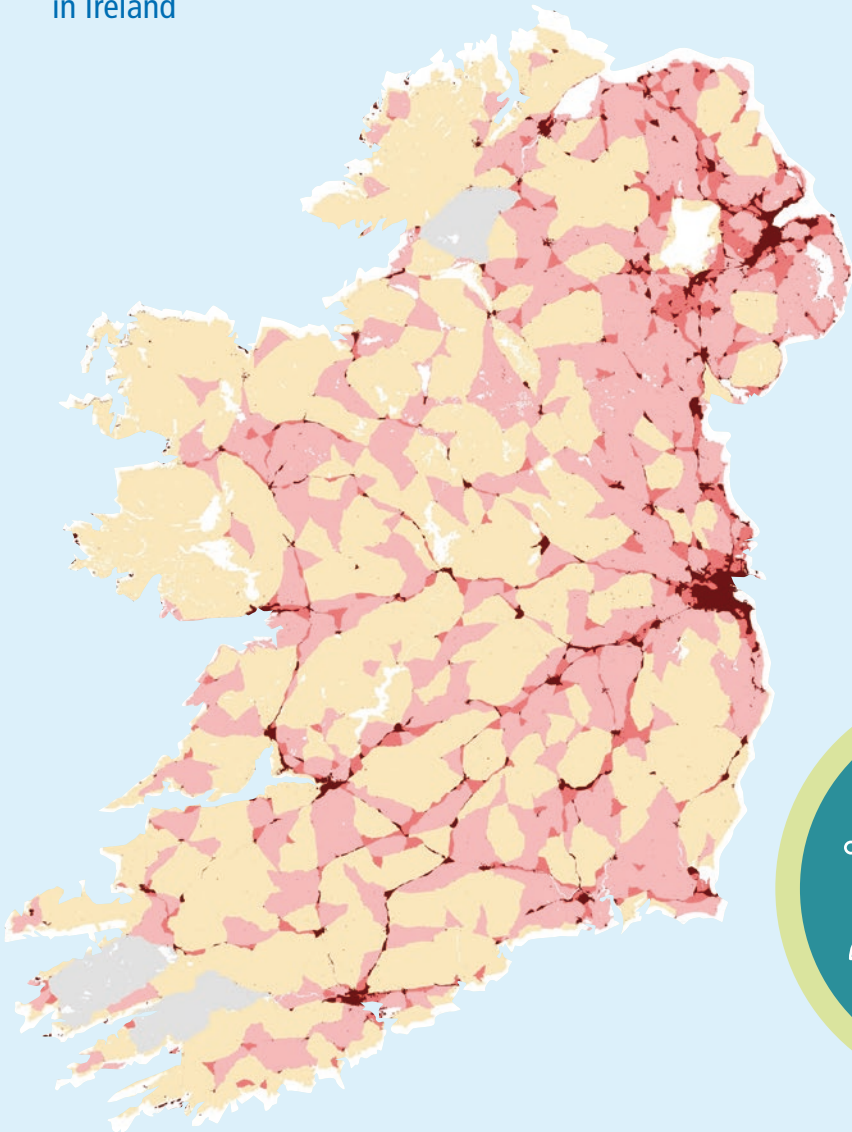7. Ranelagh Gardens
8. Palmerston Park

Sources
Ireland's Environment: An Integrated Assessment 2020.
EEA (European Environment Agency), 2020. Air Quality in Europe 2020. EEA Report No. 09/2020. EEA, Copenhagen
WHO (World Health Organization), 2006. Air Quality Guidelines. Global Update 2005. Particulate Matter, Ozone, Nitrogen Dioxide and Sulfur Dioxide. World Health Organization Regional Office for Europe, Copenhagen.
WHO (World Health Organization), 2011. Burden of Disease from Environmental Noise. Quantification of Healthy Life Years Lost in Europe. World Health Organization Regional Office for Europe, Copenhagen.
Knox, John H. and Boyd, David R, Report of the Special Rapporteur on the Issue of Human Rights Obligations Relating to the Enjoyment of a Safe, Clean, Healthy and Sustainable Environment (July 19, 2018).
United Nations General Assembly, UN Doc. A/73/188 (2018), Available at SSRN: https://ssrn.com/abstract=3287944
EPA Noise Maps: Environment and Wellbeing – Noise; https://gis.epa.ie/EPAMaps/
EPA (Environmental Protection Agency), 2019. Urban Environmental Indicators: Nitrogen Dioxide Levels in Dublin. EPA, Wexford, Ireland.
Geographic data © Ordnance Survey Ireland. All rights reserved. Licence number 2019/OSI_NMA_074.
© OpenStreetMap contributors. OpenStreetMap® is open data, licensed under the Open Data Commons Open Database License (ODbL) by the OpenStreetMap Foundation (OSMF).

Transport and Environment

Transport systems provide connectivity for delivering the goods, services, amenities and employment that underpin human wellbeing. A sustainable, accessible and efficient transport system is not only important for welfare but has a key function in trade and the economy. It also facilitates tourism and is an employer and source of government revenue in itself. Yet transport is also a major consumer of energy and material resources, and a key source of environmental pressures in Ireland, particularly of greenhouse gases, air pollutants and noise. It takes up large swathes of land and contributes to urban sprawl, the fragmentation of habitats and the sealing of surfaces. Reducing the impact of transport systems is one of the biggest challenges to delivering a sustainable and low carbon economy and society.
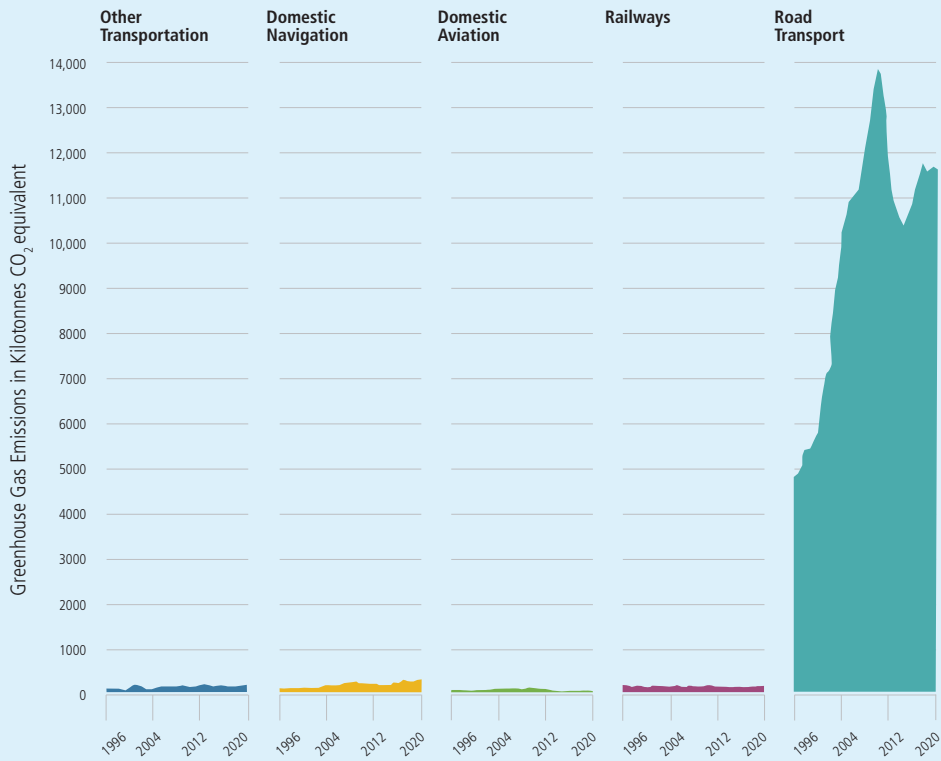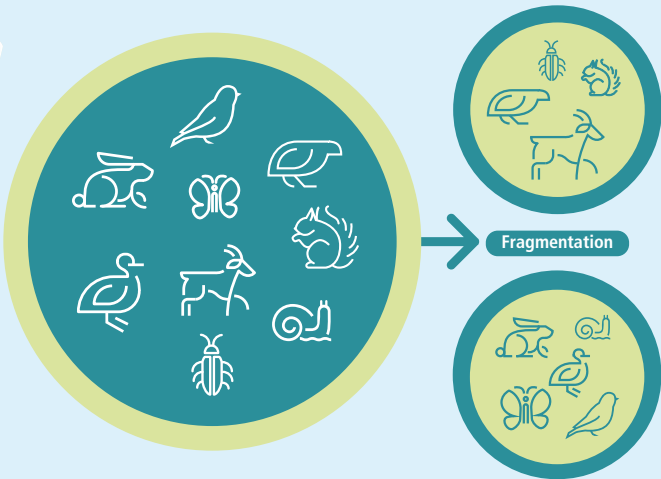
Landscape fragmentation in Ireland

Fragmentation

This map was created by the European Environment Agency (EEA) using EEA and European Union data. It shows how different parts of the landscape are interrupted by the presence of impervious surfaces and traffic infrastructure, including medium sized roads.

The more such interruptions occur across the landscape, the higher the fragmentation. Very dark red areas are very highly fragmented.

Such fragmentation is contributing to the decline of wildlife populations by isolating them into smaller and more vulnerable groups. It decreases diversity and limits access to different types of habitats that some species need at different parts of their lifecycles. Animals are at increased risk of injury or death by collisions as our road network grows.

Fragmentation

Emissions to Air

Transport emissions contribute to air pollution. Air pollution has a negative impact on human health.

CO_2

EPA data show that transport is Ireland's second largest emitter, behind agriculture, at 17.9 per cent of the national total emissions.

NOx

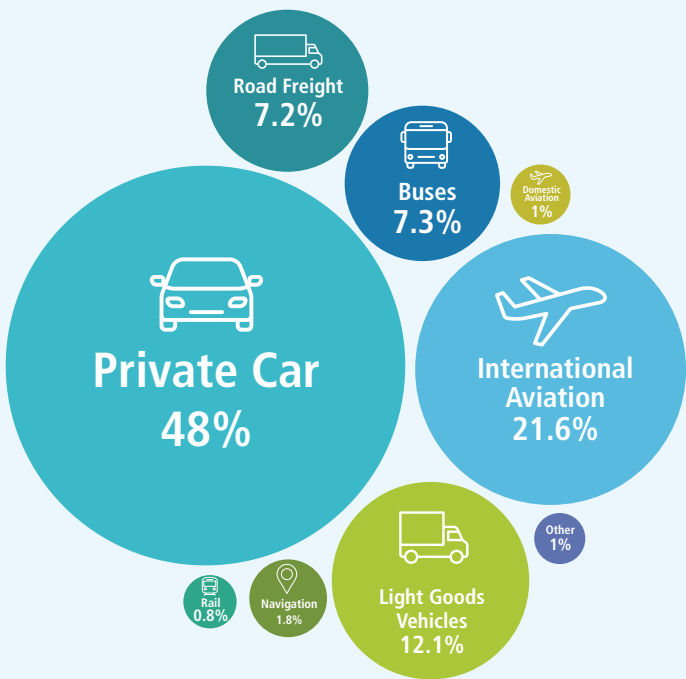Road transport emissions for nitrogen oxides were 37.8kt in 2019

$PM_{2.5}$

Road transport emissions for $PM_{2.5}$ were 1.5kt in 2019

Greenhouse Gas Emissions in Kilotonnes CO_2 equivalent

Other Transportation · Domestic Navigation · Domestic Aviation · Railways · Road Transport

Greenhouse gas emissions

In 2018 Ireland's transport emissions per capita were the fourth highest in the EU and well above the average. Increasing transport emissions makes it harder to meet the emission reduction targets: emission reduction targets are an important part of climate action and limiting global warming.

EPA Greenhouse gas inventory data tracks emission from the combustion of fuel from aviation, road, railway, water and other transportation. Between 1990 and 2019, transport emissions showed the greatest overall increase at 136.8%, with road transport increasing by 142.4%. The trends are shown in the graph above.

The 2019 EPA Provisional Greenhouse gas inventory identifies the different emissions from different transport modes, shown in the bubble chart on the right. Private cars are the largest contributor at 48%.

Road Freight 7.2%
Buses 7.3%
Domestic Aviation 1%
Private Car 48%
International Aviation 21.6%
Other 1%
Rail 0.8%
Navigation 1.8%
Light Goods Vehicles 12.1%

Sources
European Environment Agency, EEA. https://www.eea.europa.eu/data-and-maps/indicators/mobility-and-urbanisation-pressure-on-ecosystems-2/assessment
EPA (Environmental Protection Agency), 2021. Ireland's Air Pollutant Emissions 1990-2030 Environmental Protection Agency, Wexford, Ireland.
Transport emissions: http://epa.ie/ghg/transport/.

How we move people and goods

While transport greenhouse gas emissions are a challenge globally, in Ireland this is more pronounced. In Ireland, the private car is the biggest contributor to transport greenhouse gas emissions. Long term trends have been towards more private and motorised transport with only marginal increases in active transport such as walking and cycling.

This map shows a national overview of our commuting patterns. The long distance routes are not suitable for active transport: these require a shift to integrated public transport and away from reliance on private cars.

Letterkenny

Locations in
Northern Ireland

Sligo

Monaghan

Castlebar

Cavan

Dundalk

Mullingar

Athlone

Galway

Tullamore

Dublin

Portlaoise

Ennis

Wicklow

Limerick

Carlow

Kilkenny

Clonmel

Tralee

Waterford

Cork

Modes of transport used by workers

65.5%
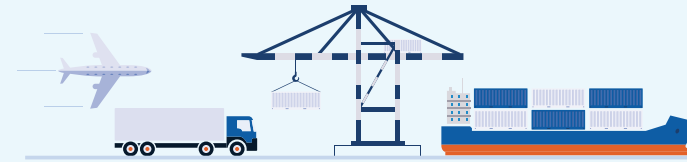Drivers and passengers
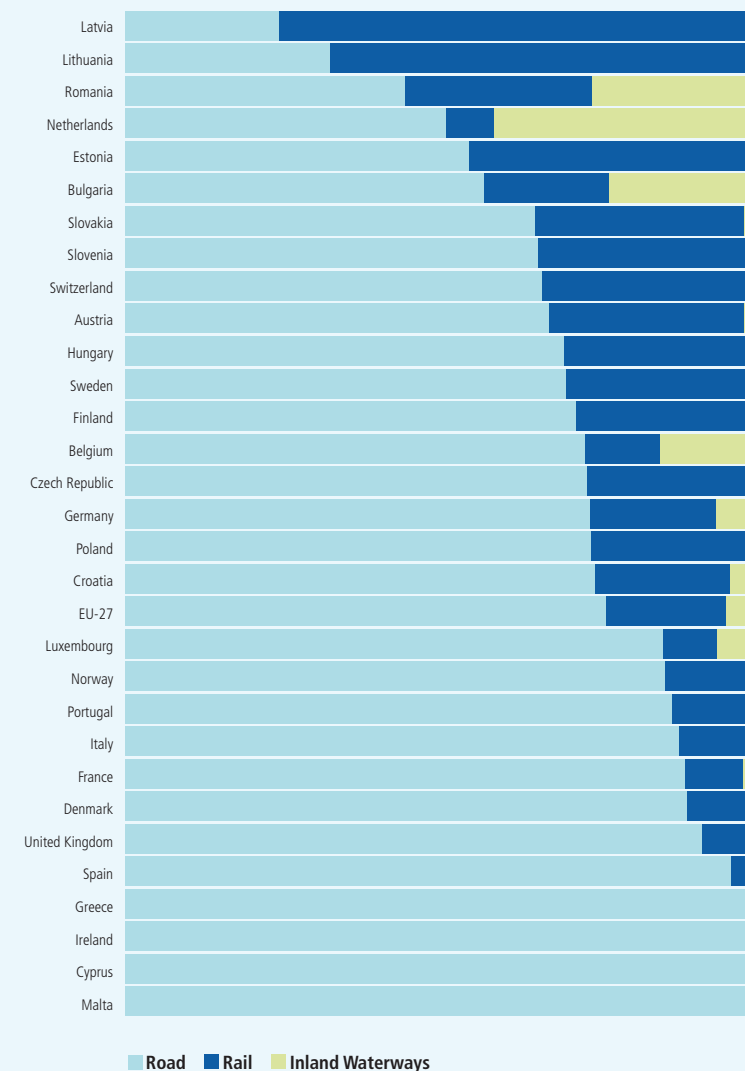
9.3%
🚌🚆

9.3%
🚶🚶

7.3%
🚐

3%
🚲

0.4%
🏍️

Modes of transport used for freight

The graph below shows the percentage of freight transport on road, rail or inland waterways in 2018 (expressed as freight tonnes per kilometre, from EuroStat). Ireland relies heavily on roads to transport freight. This is in contrast to countries like Latvia who transport more freight by rail than by road, and the Netherlands who make use of inland waterways.

Latvia
Lithuania
Romania
Netherlands
Estonia
Bulgaria
Slovakia
Slovenia
Switzerland
Austria
Hungary
Sweden
Finland
Belgium
Czech Republic
Germany
Poland
Croatia
EU-27
Luxembourg
Norway
Portugal
Italy
France
Denmark
United Kingdom
Spain
Greece
Ireland
Cyprus
Malta

■ Road ■ Rail ■ Inland Waterways

Sustainable Mobility Transformation

The way we move people and goods is placing pressure on our environment. Transitioning to a more sustainable system offers opportunities to reduce greenhouse gas emissions and to improve health and wellbeing by reducing harmful air pollutants and noise.

Achieving more sustainable mobility requires a transformation of our transport sector. This could be achieved by adopting the Avoid-Shift-Improve framework.

Avoiding journeys relies on compact spatial planning that places services close to people. This kind of planning is needed to deliver the "20 minute neighbourhood" concept , in which all important services are designed to be no more than 20 minutes' walk, cycle or public transport ride from residential areas.

Shifting requires switching the mode of transport towards more sustainable modes like public transport, cycling and walking.

Improving the energy and carbon efficiency of vehicles is at the bottom of the hierarchy. As well as efficiency improvements, using smaller vehicles and switching to power trains or alternative fuels mitigates environmental damage caused by journeys where public transport or active transport are not an option.

Sustainability

AVOID
Avoid and reduce the need for travel

Spatial planning
• compact development
• demand management

A   B

SHIFT
Shift to sustainable modes

Transport planning
• integrate active modes of walking and cycling
• integrate public transport modes of rail and bus

IMPROVE
Improve efficiency

Engineering
• energy efficiency by vehicle and engine design
• carbon efficiency by alternative vehicles and fuels

e

Decision Hierarchy

Up up and away

As we continue to fly high, so is our environmental impact

These maps show the flights in and out of all Irish airports in 2018. The thickness of the line relates to the total CO_2 for all flights to each destination country or region. The thicker the line the greater the impact.

COUNTRIES

We generate the most CO_2 emissions flying to and from these countries.

- United Kingdom
- Portugal
- Italy
- France
- Canary Islands
- Germany
- Canada
- Spain
- United Arab Emirates

United States 1,257 kilotonnes

GLOBAL

We generate the most CO_2 emission flying to and from these global destinations.

- London
- Philadelphia
- Los Angeles
- Abu Dhabi
- Boston
- Toronto
- Washington
- Dubai
- Chicago

New York 355 kilotonnes

EUROPE

We generate the most CO_2 emissions flying to and from these European destinations.

- Madrid
- Frankfurt
- Barcelona
- Munich
- Paris
- Faro
- Lanzarote
- Amsterdam
- Malaga

London 237 kilotonnes

Map labels: Toronto, Chicago, Boston, New York, Philadelphia, Washington, Los Angeles, London, Dubai, Abu Dhabi, Amsterdam, London, Frankfurt, Paris, Munich, Barcelona, Madrid, Faro, Lanzarote

Many of the highest impact global routes aren't necessarily the final destination. Irish airports serve as a hub to onward routes. Likewise, we have a lot of traffic to destinations in the United States, United Kingdom and United Arab Emirates as layovers for further destinations. Our highest impact European routes show more of these hub trends, but also some of our most popular holiday destinations like Málaga, Lanzarote, Faro, Munich and Barcelona. Our traffic to London airports is likely a combination of onward travel and business and pleasure trips to the UK.

In 2018 the emissions for these key pollutants from air traffic through Ireland was…

CO_2
Carbon dioxide: 3240 kilotonnes

NOx
Nitrogen oxides: 14 kilotonnes

$PM_{2.5}$
Particulate Matter 2.5: 134 tonnes

SO_2
Sulphur Dioxide: 864 tonnes

Dublin to Heathrow return will create 17.5 tonnes of CO_2. That's the weight of about 8.5 black cabs.

Dublin to Málaga return will create 48.7 tonnes of CO_2 That's the weight of roughly 8 African elephants.

A return flight from Dublin to JFK will create 214 tonnes of CO_2. That's more than the weight of the Statue of Liberty.

Sources
EPA, Ireland's Final Greenhouse Gas Emissions 1990-2018.
Source EPA, Air pollutant emissions in Ireland 1990-2018.